

3.4.5 West Coast Region

Exploration targets of interest within the Monterey Bay National Marine Sanctuary received considerable attention during the West Coast region workshop. The participants focused on exploration of the entire water column and the benthic environment and included the need for observations down to a microbial scale. Exploration for archeological purposes was discussed and, like the Alaska region, included some attention to the use of local traditional knowledge. The identification and location of deep corals, including an assessment of potential threats to their health, were topics receiving noteworthy attention. The need for new technologies or methods for tagging gelatinous biota were discussed and included an examination of current experiments that tag parasites on the gelatinous host to allow tracking.

The participants discussed issues related to data management and outreach. The data management issue involved the turnaround time for release of data by a principle investigator. The group felt it was reasonable for metadata to be provided for distribution within 90 days of data collection. The participants agreed that more outreach needs to be done and pointed to the success of the unique and valuable outreach partnership between the Monterey Bay Aquarium Research Institute (MBARI) and the Monterey Bay Aquarium.

The West Coast region results are provided in Table 3-7. Exploration targets of interest nominated by participants are illustrated in Figure 3-7.

Table 3-7. West Coast Region Workshop Results

West Coast Workshop	
Standard Package: Class I/II Vessel with acoustic mapping; Dive capability (ROV/AUV/ Submersible) with imagery/video and sampling equipment; Precise positioning system; CTD; Dynamic positioning & bottom high resolution survey capability (not always needed for ops); Sensors dependent upon expertise with mission; High quality communications & internet	Standard Partners: NURP; NMFS; Fish & Game; Oceanographic institutions; Universities; UNOLS; Private foundations; Museum/Aquaria; Sea Grant; Private industry; MMS; International partners; State geological surveys; State Historic Preservation Office (SHPO); Canadian counterparts; Mexican counterparts; Educational outreach group; NMS; Navy; NOAA; NASA; NSF; Alliance for Coastal Technology (NOAA); USGS; USCG; NGOs

West Coast Workshop Results						
ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
237	Archeology	Ships (shipwreck) of importance	Mapping habitat; multidisciplinary effort; chemo/bio/geo	Workshop results and historical records. Determine location. Luckenbach (San Francisco); Montebello (off Cambria) possible tar issue; Pac Baroness (entrance of Santa Barbara Channel) bulk cargo of copper sulfate.	Standard Package; Mapping technology; chemical analysis; shipwreck integrity tools	Standard Partners
238	Archeology	Marine archeology/ human habitat	Historical records/archives; traditional knowledge; pick sites; document & remove; map (paleo shoreline); pick sites; doc & remove; look at mapping info from other missions then go to sites; develop strategy on where to look; location; photo documentation; controlled removal; habitat; climate	Develop strategy on where to look; Channel Islands; 140 m below sea level (old coastal level); Santa Barbara Channel; Baja California	Standard Package: high resolution imaging; sidescan; magnetometer; removal technology tools; laser imaging; saturation diving; mapping of shorelines; light sub-bottom profiling; laser linescan technologies to direct sampling; coring technologies	Insurance industry; EPA; Coast Guard; NMS; DOS; DOD; states; National Geographic; Discovery; Salvage Industry; (Ole Varmer - NOAA NOS Shipwreck Attorney)

West Coast Workshop Results						
ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
239	Marine Organisms	Use of pelagic and benthic environments by economically/ecologically important species; by Rare Species	Life history; migration patterns; habitat; population; distribution and abundance; environmental properties; Track location of critter; Beacon to uniquely ID individual; Attach Critter Cam; fronts/eddies - use remote sensing to ID areas; Listen and observe sounds; LIDAR to monitor; observe; track fish	Basin wide; continental shelf; oceanic; existing protected areas; also see offshore productivity list; fronts and eddies	Standard Package; Satellite tag; data storage tags; satellite remote sensing (benthic and passive); acoustics (passive and active); genetic tools; aircraft; human observation; CODAR; Tagging technology; Critter Cam; LIDAR	Standard Partners; NPS; Military; biogeochemistry academic community; international partners; Stanford Hopkins Marine Station; CoML; Moss Landing Marine Laboratory; Packard Foundation
256	Benthic Environment	Deep sea floor	Knowledge of the deep sea floor; surveys via AUVs; sweeping water column; detailed survey then expand; biosphere at seafloor; benthic community; crust & microbial communities; i.e. all deep sea floor communities	Bottom mixed layer to sea floor; deep water North Pacific on coast	Standard Package; Image recognition and software; HDTV & holographic; improving control systems for ROVs - adapt to situations; software development; flow cytometers for microbe levels (refinement in technologies); higher flow sampling for midwater communities; navigation; nested acoustics techniques; continuous capability; capturing particle flux; long-term & long-standing observatories; coring; genomics on a chip	Standard
336	Benthic Environment	Benthic invertebrates	Abundance of species occupying sub-tidal rock substrates in Washington and Oregon, especially benthic invertebrates	Rock substrates in Washington and Oregon	Standard Package	Standard Partners
236	Corals - Deep Water	Deep water corals	Locate; map; characterize and ID; assessment of threats - existing and emerging; other species supported by habitat	Rocky bottom areas; low sedimentation rates; high currents - below trawl depth. 1-2 KM priority. Monterey Canyon; Astoria Canyon Flanks of seamounts (see above)	Standard Package; deep camera tows; further development of laser technology; lowlight cameras in rough terrain; slow moving steady AUVs	Standard Partners

West Coast Workshop Results						
ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
231	Ecosystem - Abrupt Topography	Banks; fracture zones; subduction zones; canyons; sea mounts	Mapping; subsurface information; sub bottom profiling; biosampling; currents; temperature; chemical description; cores to sample the microbial activity	Cordell Banks; Tanner/Cortez Bank; Oregon Bank complex; Southern California Border Banks; Mendocino; Molokai; Canyons: Big Sur Canyon Complex; Pt Conception complex; Juan de Fuca; Rogue Canyon; Eel River Canyon; Quinalt Canyon; Santa Cruz Canyon; South American canyons (re: strike slip transition); Davidson; Guide; and Pioneer Seamounts; and Gumdrup and Taney Seamounts; Brown Bear and Cobb Seamounts; Bowie Seamount Chain	Chemical sniffers; NMR; genetic fingerprinting; acoustic mapping; long term chemical sampling (e.g. OsmoSamplers)	Standard Partners
251	Ecosystem - Abrupt Topography	Biological oasis hot spots	Close in seamounts then remote seamounts; survey triage of hot spots; different tactics for each hot spot; discover; inventory biota; explore; identify processes; find new areas	Seamounts; canyons; upwelling; ocean frontal zones; river plumes; seafloor hydrothermal vents	Standard Package; Imaging - HDTV & holographic; nested acoustics techniques; continuous capability; capturing particle flux; long-term & long-standing observatories; coring; genomic on a chip; generation of sampling technology (give 100x more data) ; genetic markers on AUVs; remote sensing technology on AUV; real time capability; chemical sensor; PSATS; electronic tags; <20 microns technology very important; anecdotal fisherman reports; "Ready 5" capability	Fishing industry (Russians; etc.); MMS

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ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
254	Ecosystem - Canyons	Canyon systems; gullies (physical; chemical; biology systems)	Hyperpicnal flows; observing systems for long term; investigate submarine rock flows; turbidity currents; internal waves; bridge from shelf to deep sea; develop proxies of variability over time in sediments	West coast; Big Sur Canyon Complex	Standard Package; Forward scatter acoustic techniques; equipment survivability cabling systems; need hardened sensors; "instrumented rock"; long-term instruments that can survive in the canyon environments; temporal exploration; physical ocean modeling	Cable companies; USACE; Coastal States Organization (CSO)
241	Ecosystem - Extreme Environments - Vents, Seeps, & Volcanoes	Microinvertebrate assessments	Microinvertebrate assessments e.g. kelp forest assemblages and soft habitat; microbial ocean; assemblages; interactions; predator/prey relationship	California kelp forests; soft benthic habitats out to 60' (20-60' water depth)	Fiber optics; basic archeological sampling; species identification	Standard Partners
242	Ecosystem - Extreme Environments - Vents, Seeps, & Volcanoes	Microbial	In situ sampling and genomic identification & chemistry; particle counter for small particles - size fractions; cameras - is there a good proportionality ratio that is pretty universal; microbial assemblages; characterization; taxonomy; role they're playing in larger ecology; bio/geo/chemical processes; bioactive compounds	Could go anywhere and make fundamental discoveries i.e. polar oceans; polluted and non polluted locations to compare microbial assemblages; Throughout water column including the substrate	Moorings; smaller vessels; genomic; chemical analysis tools; In situ genetic sampling	Biomedical industry; EPA; Fish and Game; local and state health departments; Surfriders
243	Ecosystem - Extreme Environments - Vents, Seeps, & Volcanoes	Seeps	Mapping; subsurface information; sub bottom profiling; biosampling; currents; temperature; chemical description; cores to sample the microbial activity	Between Heceta Bank and Hydrate Ridge; along alluvial washout of Monterey Canyon.	Chemical sniffers; NMR; genetic fingerprinting; acoustic mapping; long term chemical sampling (e.g. OsmoSamplers)	Standard Partners
244	Ecosystem - Extreme Environments - Vents, Seeps, & Volcanoes	High temperature hydrothermal environments	Relatedness between sites	West coast of North and South America (fragments of the Farallon Plate) - interaction of a ridge with a continental margin); opportunity to look thru genetic mutations; how long ago were things isolated?	ROV sampling tools; physical oceanographic sensors; Larval sampling tools	Standard Partners

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ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
245	Ecosystem - General	Chemistry; physics; geology	Biogeographic cycling; inputs/outputs cycling	Needs to be done in the context of the other identified exploration needs	In situ chemical sensors; satellite data; remote sensing	Standard Partners
229	Ecosystem - Shorelines to Ledges	Continental shelf	Benthic; Marine Protected Area; proposed Marine Protected Areas; cables; then go observe; general baseline mapping (high resolution); habitat substrate; geo/bio/chem; current; temperature; ID and characterize	West Coast; existing protected areas; proposed Marine Protected Area cable routes; heavily trawled areas; areas of heavy coastal/urban development; same locations as above; also untouched areas	Standard Package - multibeam; bioacoustics tech; ADCP; seismic profiling; remote sensing; observatory approach; standard regular remote sampling techniques; temporal/seasonal sampling tools; higher resolution remote sampling; processing/visualization tools	Standard Partners; states; sanctuaries; NOS; NOAA hydrographic program
252	Ecosystem - Shorelines to Ledges	Nearshore habitat; archeological paleoclimate area	Habitat on nearshore (shelf and slope); Archeological paleoclimate area; targeted anthropogenic impacts; high definition visual surveys; look for arch. sites of previous civilization; look for deeper wrecks; understanding of flows of chemicals; fisheries; understanding biological hot spots; sediment transport; physical; current flow interactions; discover history influences; understanding margin marine boundary layer	0-1000m depth; 0-100m transport	Standard Package; sidescan; magnetometers; sub-bottom profiling; laser line scan; range gating system; geochemical measuring systems; geology system (porosity); sediment transport system (suspension); generation of sampling technology (give 100x more data); genetic markers on AUVs; remote sensing technology on AUV; etc; real time capability; chemical sensor	Cultural resource organizations; Naval Oceanographic Office; oil companies; museums; NGOs; National Cultural Archival Organization; States Historical Preservation; tribes/islanders; ecotourism
253	Episodic Events	Plate scale to mesoscale	Plate scale to mesoscale observatory; long-term understanding of episodic events; gyre scale; absorption of CO ₂ ; needs thorough mapping effort; collaborative effort; new ways to do oceanography; understanding fluid flux productivity of subduction zones; sources of interplanetary life	Observe 50-70km	Large logistics; huge communications requirements; fiber optic observatory	Telecommunication industry; oil/gas industry; Canada; Germany; etc.

West Coast Workshop Results						
ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
257	Marine Organisms	Pelagic animal movement and orientation	How animals find guideposts in the open ocean; animals as ocean explorers; how the populations succeed; behavior patterns; interactions with ocean structures; use of habitat; range and navigation	Basin scale Pacific Ocean; eastern North Pacific Ocean; entire water column	Pop-Up Satellite Archival Transmitters(PSATS); archival tags; acoustic network tracking; active acoustic tracking; ARGOS; imaging systems	University; electronics industry; CoML; fishermen (recreational & commercial); conservation groups
258	Ocean Resources - Energy & Minerals	Crustal processes	Hydrates; fluids (seawater and gases); Crustal processes that affect fluid flow; determination of location and volume of hydrate resources; classification; chemistry; fluid flow; subduction zone; hydrothermal processes; microbial populations and dynamics; fluid pressure and quantification of flow	300m-3km (maybe more) depths; emphasize below 1000m; EEZ; outcroppings; plate scale; active seeps; middle of plates	Standard Package; Acoustic mapping; higher resolution chemical sensors	Standard Partners
230	Pelagic Environment	Midwater	Species diversity; ID and characterize; food web; link between upper water and benthic water; how the midwater functions in this role; evolutionary relationships; geographic relationships; connectivity	Gross global sampling (have some info on Japan and Monterey Bay)	Standard Package; Suction samplers; insulated compartment; observation & tracking technology; large samplers (new tech); collection tech; AUVs that follow; critters (new tech); Genetic tools; ROVs for filming; sampling and observing behavior; HDTV video very useful; establishing strobe frame photography at some time series sites to get understanding of change of abundance	Standard Partners; HBOI; Canada; MBARI; JAMSTEC (Japan); National Geographic Society; Discovery Channel; Monterey Bay Aquarium; other aquaria

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ID	Category	Information Need/Gap	What	Where	Enabling Technologies	Partners
250	Pelagic Environment	Deep sea water column	Knowledge of the deep sea water column (largest biomass on planet); biota - what organisms exist (distribution; abundance; dynamics)	Bottom mixed layer to sea floor; deep water North Pacific on coast	Standard Package; Image recognition and software; improving control systems for ROVs - adapt to situations; software development; flow cytometers for microbe levels (refinement in technologies); higher flow sampling for midwater communities; nested acoustics techniques; continuous capability; capturing particle flux; genomic on a chip	Standard partners
255	Pelagic Environment	Euphotic zone productivity	Productivity of ocean in euphotic zone; understanding life stages of organisms; discover new members; <20 microns (includes viruses; parasites); spatial structures (scales); need balance equation	Euphotic zone; Central Gyre; Monterey Bay	Standard Package; new genetic methods; new techniques for energy flow thru life form systems; genetic probes; active fluorescence; in-situ visualization; observation techniques	Standard Partners; Russia; Poland; agriculture companies; commercial fisheries; remote sensing (NASA)

West Coast Region Exploration Targets of Interest

1. Astoria Canyon
2. Coquille Bank
3. Cordell Bank
4. Davidson Seamount
5. Eel River Canyon
6. Guide Seamount
7. Gumdrup Seamount
8. Heceta Bank
9. Johnston Seamount (not on chart)
10. Juan de Fuca
11. Mendocino
12. Monterey Bay
13. Monterey Canyon
14. Pioneer Seamount
15. Pt Conception
16. Quinault Canyon
17. Rogue Canyon
18. Santa Barbara Island (not on chart)
19. Santa Barbara Channel (not on chart)
20. Santa Cruz Canyon (not on chart)
21. Stonewall Bank
22. Sur Canyon
23. Taney Seamounts
24. Tanner/Cortez Bank (not on chart)

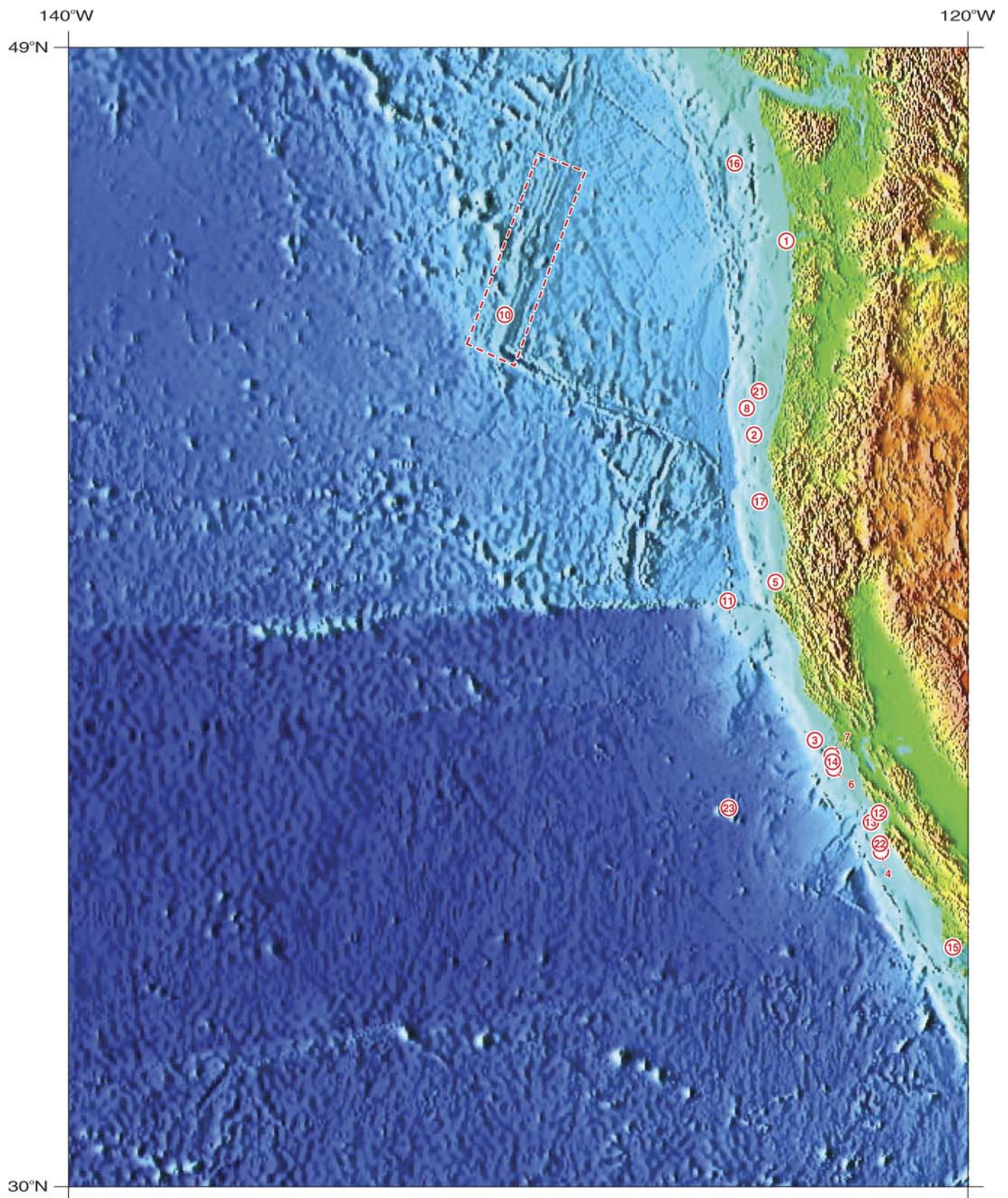


Figure 3-7. West Coast Region Exploration Targets of Interest